Judul Disertasi

PAPARAN PESTISIDA, AKTIVITAS KOLINESTERASE, DAN RESPONS IMUN PADA PETANI DI KABUPATEN KARANGANYAR

Oleh: Dr. Setyo Sri Rahardjo, dr., M. Kes.

Penggunaan pestisida yang tidak benar dapat mencemari lingkungan dan meracuni manusia melalui penghambatan enzim asetilkolinesterase. Pestisida juga mempengaruhi respons imun manusia, tetapi informasinya masih sangat terbatas. Tujuan penelitian ini adalah menganalisis kuatnya hubungan antara residu pestisida organofosfat dalam tanah dan aktivitas kolinesterase, residu pestisida organofosfat dalam tanah dan kadar kortisol, aktivitas kolinesterase dan respons imun (IL-2, IL-4, dan IFN-γ), kadar kortisol dan respons imun, dan residu pestisida organofosfat dalam tanah dan respons imun petani.

Penelitian ini menggunakan rancangan *observasional* dengan pendekatan *cross sectional,* pengambilan sampel menggunakan *stratified random sampling.* Subyek diperoleh dari dua kelompok petani di wilayah Kecamatan Mojogedang Kabupaten karanganyar. Satu kelompok menggunakan pestisida organofosfat dan kelompok lain menggunakan pestisida organik. Subyek yang memenuhi kriteria dipilih 35 petani dari tiap kelompok.Data diperoleh melalui wawancara, pemeriksaan lahan pertanian, dan pemeriksaan sampel darah petani. Analisis data menggunakan regresi linier sederhana dan regresi linier ganda.

Hasil analisis data menunjukkan terdapat hubungan signifikan (p=0,016) antara residu pestisida organofosfat profenofos dan aktivitas kolinesterase. Tidak terdapat hubungan signifikan (p=0,591) antara residu pestisida organofosfat profenofos dan kadar kortisol. Terdapat hubungan yang signifikan antara aktivitas kolinesterase dan respons imun (IL-2 p=0.001, IL-4 p=0.047, dan IFN-γ p=0.018). Tidak ada hubungan signifikan antara kadar kortisol dan respons imun (IL-2 p=0.386, IL-4 p=0.592, dan IFN-γ p=0.884). Terdapat hubungan signifikan antara residu pestisida organofosfat profenofos dan respons imun (IL-2 p=0.016 dan IL-4 p=0.23), tetapi tidak ada hubungan signifikan dengan IFN-γ (p=0,080).

Kesimpulan dari penelitian ini adalah residu pestisida organofosfat profenofos mempunyai hubungan signifikan dengan aktivitas kolinesterase petani, dimana peningkatan residu pestisida organofosfat profenofos akan menurunkan aktivitas kolinesterase. Residu pestisida organofosfat profenofos tidak mempunyai hubungan signifikan dengan kadar kortisol. Aktivitas kolinesterase mempunyai hubungan signifikan dengan respons imun, dimana hambatan aktivitas kolinesterase akan menurunkan respons imun. Kadar kortisol tidak mempunyai hubungan signifikan dengan respons imun. Residu pestisida organofosfat profenofos mempunyai hubungan signifikan dengan respons imun (IL-2 dan IL-4), dimana peningkatan residu pestisida profenofos akan menurunkan IL-2 dan IL-4,sedangkan residu pestisida organofosfat profenofos dan respons imun (IFN-γ) tidak mempunyai hubungan signifikan pada petani di Kabupaten Karanganyar. [**Kata kunci: profenofos, aktivitas kolinesterase, kortisol, IL-2, IL-4, dan IFN-γ**]

EXPOSURE TO PESTICIDE, CHOLINESTERASE ACTIVITY, AND IMMUNE RESPONSE ON FARMERS IN KARANGNAYAR . Improper use of pesticide can pollute the environment and poison human since it leads to the inhibition of the acetylcholinesterase enzyme. Pesticide may also affect

human's immune response; however, evidence for this hypothesis is still very limited. The research aims at analyzing the relations between organophosphate pesticide residue in the soil and cholinesterase activity, organophosphate pesticide residue in the soil and cortisol level, cholinesterase activity and immune response (IL-2, IL-4, and IFN-γ), cortisol levels and immune response, and organophosphate pesticide residues in the soil and the immune response of farmers.

The research was conducted through observational method with cross-sectional approach and the sampling technique wasused stratified random sampling. The research subjects were selected from two groups of farmers in Mojogedang, Karanganyar. One group used organophosphate pesticides and the other used organic pesticides. From each group, the researcher selected 35 farmers who meet certain requirements as the subjects of the research. The data were obtained through interviews and blood test. The data were analyzed using simple linear regression and multiple linear regression technique.

The result of the data analysis showed that there was a significant relation between organophosphate pesticide profenofos residue and cholinesterase activity (p=0.016). There was no significant relation however, between the organophosphate pesticide profenofos residue and cortisol level (p=0.591). A significant relation was also found between cholinesterase activity and immune response (IL-2 p=0.001, IL-4 p=0.047, and IFN-γ p=0.018). Whereas, there was no significant relation between cortisol level and immune response (IL-2 p=0.386, IL-4 p=0.592, and IFN-γ p=0.884). There was a significant relation between the organophosphate pesticide profenofos residue and immune response (IL-2 p=0.016 and IL-4 p=0.23), but no significant relation with IFN-γ (p=0,080).

The conclusion of the research is the organophosphate pesticide profenofos residue results a significant effect on the farmer's cholinesterase activity, in a way that when there is a high level of residue, there will be a decrease in the cholinesterase activity. The organophosphate pesticide profenofos residue has no significant effect on cortisol level. The cholinesterase activity has significant effect on immune response in a way that the inhibition of cholinesterase activity will decrease the immune response. Cortisol level has no significant relation with the immune response. An increase in organophosphate pesticide profenofos residue leads to a decrease in immune response (IL-2 and IL-4), however, the organophosphate pesticide profenofos residue and immune response (IFN-γ) does not significantly affect the farmers in Karanganyar. [**Keywords: profenofos, cholinesterase activity, cortisol, IL-2, IL-4, andIFN-γ**]